

1857, $\frac{1}{1047.54}$; Professor Möller's, from the motions of Faye's Comet, $\frac{1}{1047.788}$. As the difference between the largest and smallest of these values does not exceed the $\frac{1}{1000}$ th part of the mean, we may consider this important element in the solar system as well established; and it is very satisfactory to find determinations made by different methods so well confirmatory of each other,

Notes on Mars, 1873. By E. B. Knobel, Esq.

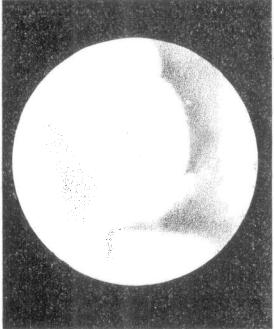
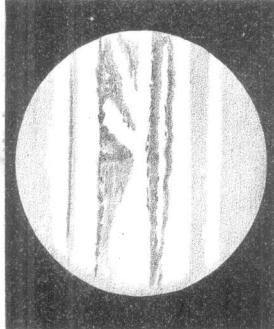
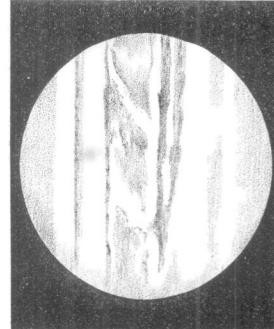
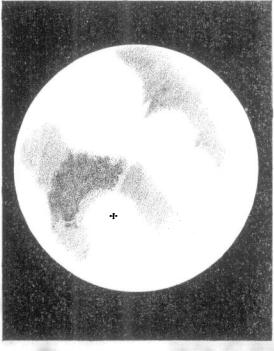
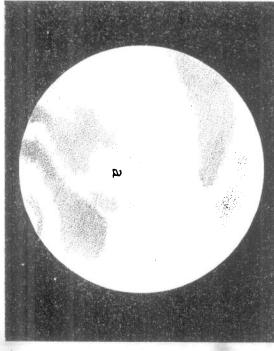
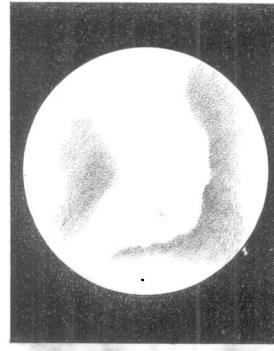
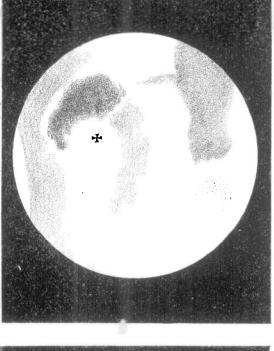
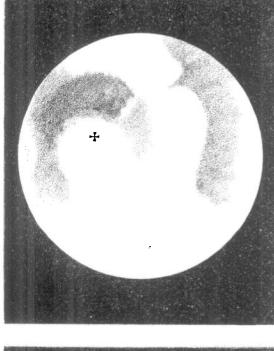
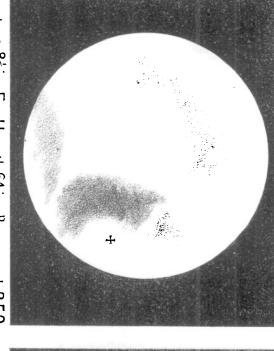
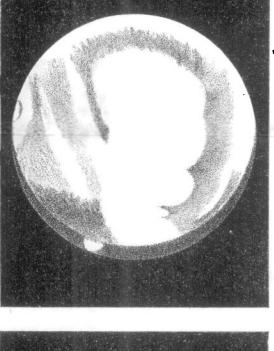
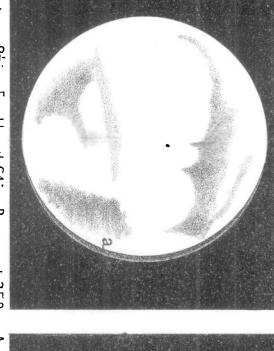
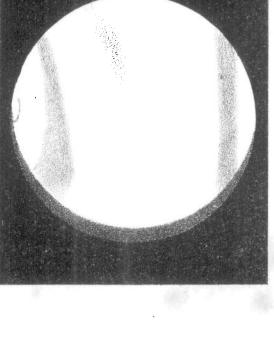
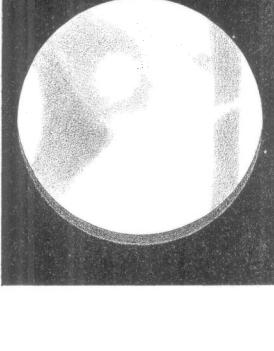
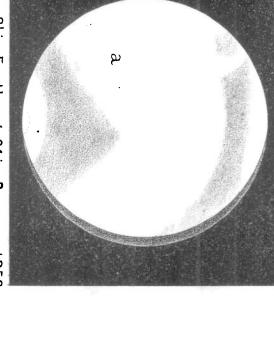
Observations of *Mars* at the opposition of 1873 have been attended with many atmospheric impediments. The planet's low altitude, coupled with unsteady air for many nights, has rendered the accurate delineation of its features most difficult.

The accompanying series of seventeen sketches, which I beg to submit to the Society, has been made with an 8½-inch silvered glass reflector, of excellent quality, mounted as an alt-azimuth, and only those sketches are exhibited in which I have confidence in their representing what was actually observed. No sketch was made without the air was sufficiently steady to bear a power of 250, at least, on the planet.

Many features have been noticed agreeing fairly with the observations of Mr. Dawes, but with some noteworthy exceptions —though I should say that, not having seen Mr. Dawes's drawings, except those given by Mr. Proctor in his *Other Worlds*, and those in the *Astronomical Register* for 1865, I can only judge of the agreement or disagreement by comparison with Mr. Proctor's charts of *Mars* in the *Monthly Notices* for January 1873. And here I must refer to the beautiful accuracy of some of these charts in representing certain aspects of the planet. Sketch No. 14, for instance, might almost have been copied from one of them. The most remarkable exception is shown in sketches Nos. 5 to 13, in which a dark marking is depicted stretching nearly to the north pole, which I cannot reconcile with any drawings I have seen, except one of Secchi's in Chambers' *Descriptive Astronomy*, with which it agrees very well. This dark marking is well and clearly, though by no means sharply, defined on the west, and from it proceed, in a westerly direction, two bands much less dark, as shown in Sketches Nos. 12 and 13. No trace whatever of any light marking across this dark mass was observed on any occasion, though carefully scrutinised under all powers. Glimpses of a band of light S.E. of it were observed on a few nights, as shown in Sketches Nos. 5 to 9.

Due east of the centre of this dark marking, a white spot was noticed from May 8th to 22nd. On May 19th, at 10.20, and May 22nd, at 11.30, this white spot was seen on the terminator, glistening as bright as the polar ice; and I would remark, though

OBSERVATIONS AT BURTON ON TRENT.

N°1. March 26 th 1873. 7.50 C.M.T.	JUPITER	Aperture 8½ ins Focal length 64 ins Power used 208	
N°2. April 23 rd 1873. 11.10 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 208 <i>Sat N in Transit.</i>	
N°3. April 23 rd 1873. 12.15 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>a Very White</i>	
N°4. April 26 th 1873. 11.20 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250	
N°5. May 11 th 1873. 9.15 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>a Very White Spot.</i>	
N°6. May 11 th 1873. 10.0 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°7. May 12 th 1873. 7.45 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°8. May 12 th 1873. 12.10 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°9. May 19 th 1873. 12.30 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°10. May 19 th 1873. 10.20 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°11. May 19 th 1873. 10.20 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°12. May 19 th 1873. 12.30 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°13. May 22 nd 1873. 11.30 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 250 <i>+ White Spot.</i>	
N°14. May 23 rd 1873. 9.0 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 300 <i>Kinds S seen observed in same Position April 19th 13.30 C.M.T.</i>	
N°15. May 30 th 1873. 9.50 C.M.T.	MARS	Aperture 8½ ins Focal length 64 ins Power used 300 <i>Kinds S seen observed in same Position April 19th 13.30 C.M.T.</i>	

it requires confirmation, that I thought the spot brighter on the terminator than when near the centre of the disc. The sketch made May 22nd, No. 13, represents the white spot apparently raised above the disk by irradiation, though of course exaggerated.

With regard to the region containing "Dawes' Forked Bay," south of this dark marking, I would beg to direct attention to the great distinctness of all this coast-line. It has appeared to me more sharply defined than any other feature in the Martial surface. Momentary views of exquisite definition were obtained on May 19th and 22nd, when more was seen than I could possibly depict in the sketches; several pointed markings were observed with great distinctness, but I could not detect the band connecting this sea with that north of it. This connecting band, called "Dawes' Strait," is a very difficult object, and I could seldom see it. I noted it on May 12th, and also on the following night; but the drawings Nos. 7 and 9, as regards this feature, do not accord very well; in one it is shown as a straight marking, in the other it is curved.

The comparative clearness of the northern Martial sky and obscuration of the southern have been constantly noticed; frequently dark markings have been clearly visible up to the north polar zone, but on no occasion have I detected any markings so near to the south pole.

The north polar ice has occasionally been visible, raised by irradiation, as a projection from the disk. On June 1st, at 9^h 30^m, I noticed particularly that, with a power of 144, the north polar ice appeared projected beyond the disk of the planet, whereas with 300 the very small ice cap seemed to be within the disk, and situated eccentrically in the polar zone.

The south polar ice, it is also believed, has been observed, especially on May 14th, when it appeared of quite a pale sky-blue colour, evidently by contrast.

The difference of tint in the dark markings of the planet *Mars* does not appear to have attracted much attention from astronomical observers, and doubtless in many instances markings have appeared less dark than they have been noticed at other times, in consequence of haziness in the Martial atmosphere. But the result of careful study of the planet, in 1873, seems to prove that there are very great differences in the tint of these markings, and that these differences are constant. The darkest markings I have observed are the "Kaiser Sea," and the dark marking described above, which I presume to be "Delambre Sea." The faintest shades which appeared constant in tint are surrounding the spot called Fontana Land.

A close examination of the Kaiser Sea has revealed a curious absence of uniformity in tint, which doubtless has been remarked by much more experienced observers than myself. I beg to append a diagram in which I have reduced to an outline the particular differences I have observed (of course no outline was

actually seen).* The darkest region appears to be contained within the red line, and in Mr. Dawes' drawing, No. 6, in the *Astronomical Register* for 1865 I can detect the same feature; but within this boundary some intense dark markings were observed, after long and severe scrutiny. These particularly dark marks seemed to have a branching character, and were observed on May 25th and 27th with a high power, and came out very much more distinctly through slight fog or haze, or a light passing cloud which intensified them and first revealed them to me. I look with much interest to the results obtained by other and better observers with more powerful optical means; but I must mention that, when the Kaiser Sea was visible in April, I did not notice anything of these peculiarly intense marks, though the dark region marked in red was very distinctly made out.

Burton-on-Trent, June 11, 1873.

Clock by Dr. Franklin. By R. J. Lecky, Esq.

The clock, which I have much pleasure in showing to the Society this evening, was made about the year 1819 for Roger Dartnell, Esq. M. D., Youghal, Co. Cork, and was used as his sidereal clock, in his Observatory on the town wall of that place, until his death, in 1832, when it came into my possession by bequest from him. The pendulum, with its mode of suspension, the friction crutch, and the weights, I have added to it myself.

It is, I believe, the simplest form of a really useful clock ever contrived, and is described in Rees' *Cyclopaedia*, article "Clock," and figured in the plates of *Horology* as invented by Dr. Franklin; but Dr. Rees does not give his authority for this. He also gives another of somewhat similar construction by Ferguson, but not so simple as Franklin's. The train consists of only three wheels and two pinions. The great or centre wheel has 160 teeth, driving a pinion of 10 leaves on the arbor of the intermediate wheel; this has 120 teeth, driving 8 leaves on the 'scape wheel, which is of the ordinary kind, and has a simple "Graham" dead-beat 'scape-movement, not jewelled. This wheel, of course, carries the seconds-hand in the usual way; and the great wheel, which revolves in four hours, carries a hand which denotes both minutes and hours, the periphery of the dial being divided into 240 minutes, and each of the four quadrants consecutively numbered 0 to 60. Each quadrant, therefore, represents three hours, within which time it is requisite to know the hour; and herein consists the greatest drawback to the usefulness of this form of clock. This, however, might be easily remedied by a 12 or 24-pointed star and divided plate or hand set forward by four pins in the great wheel. The driving-weight simply acts on a grooved pulley fixed to the arbor of the great wheel, as in a common Dutch clock, and has a maintaining spring and ratchet to keep the clock going while being

* This drawing was exhibited at the Meeting.